FIG. 1

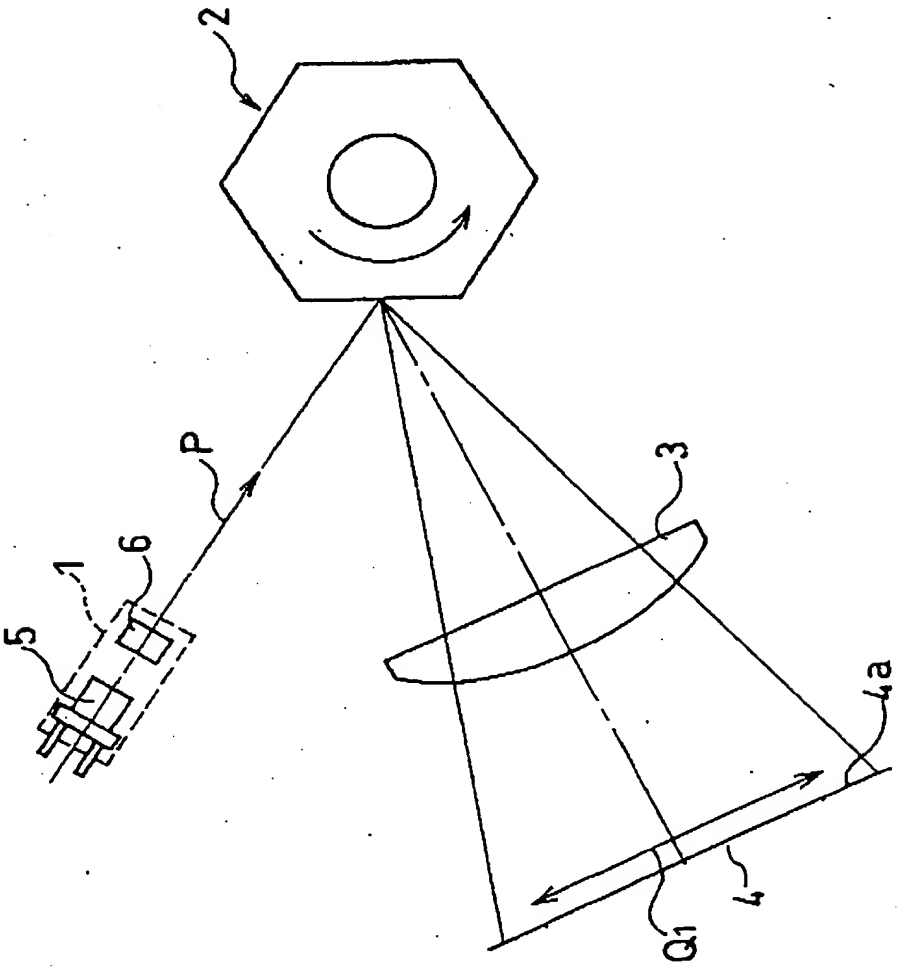


FIG. 2

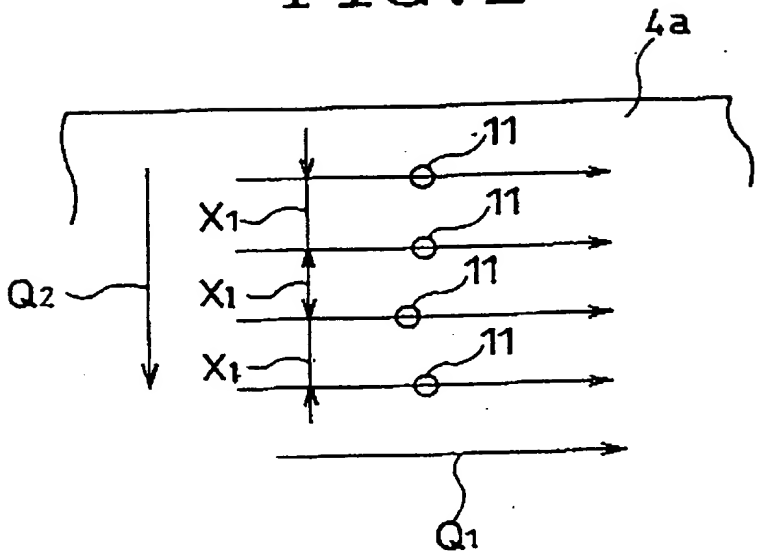


FIG. 3

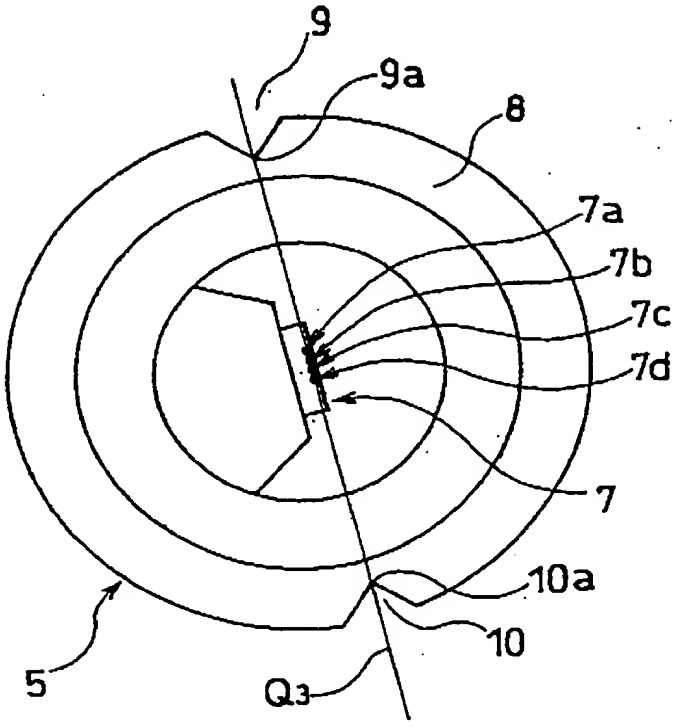


FIG. 4

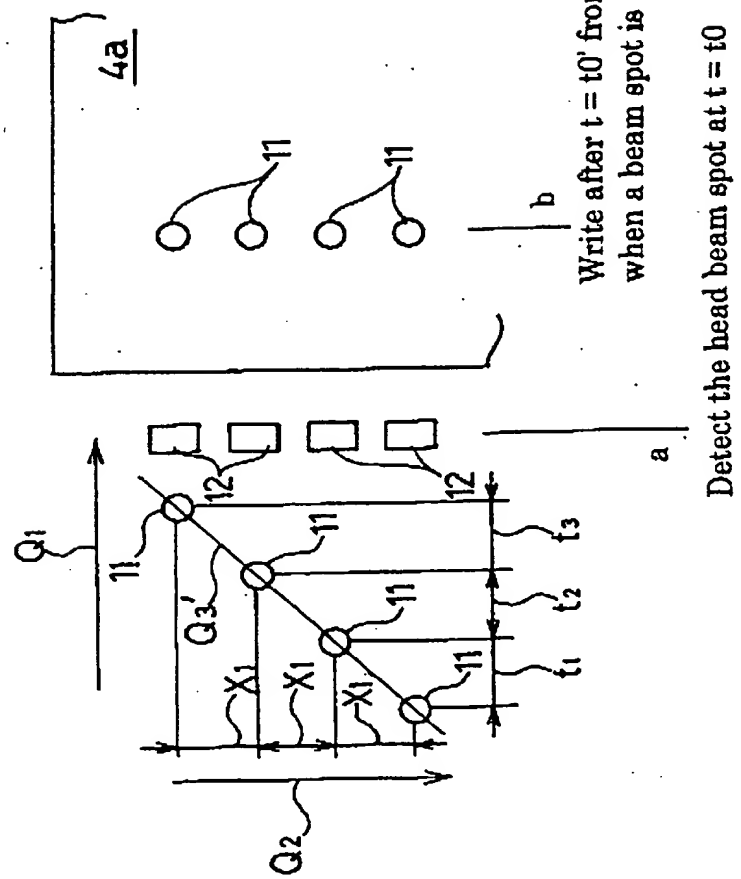
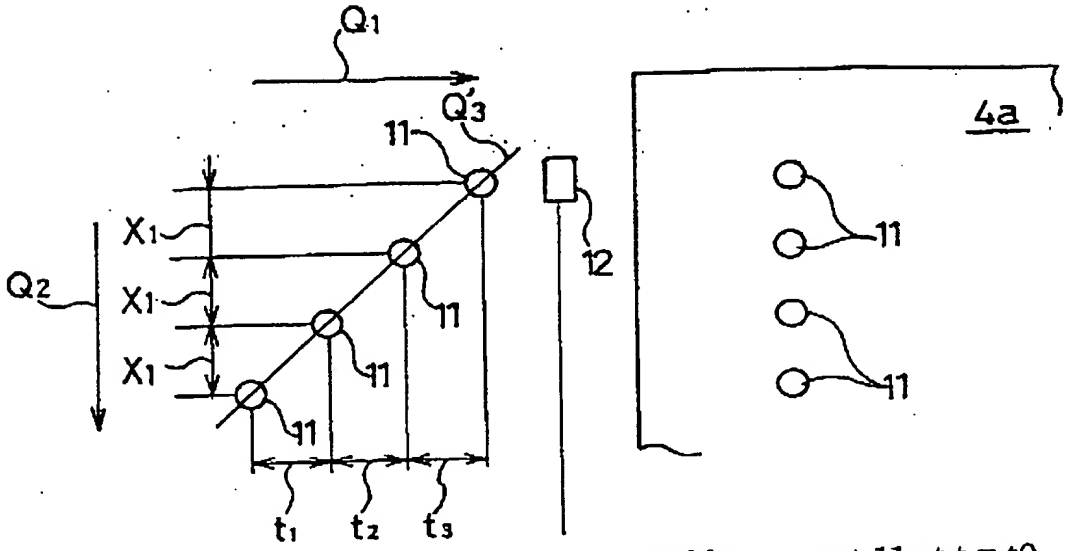

4a
11
11
b
Write after t = t0' from
when a beam spot is detected by a sensor
Detect the head beam spot at t = t0
a
12
12
Q1
11
11
11
11
Q3'
X1
X1
X1
t3
t2
t1
Q2

FIG.5(a)



Detect the head beam spot 11 at t = t0

FIG.5(b)

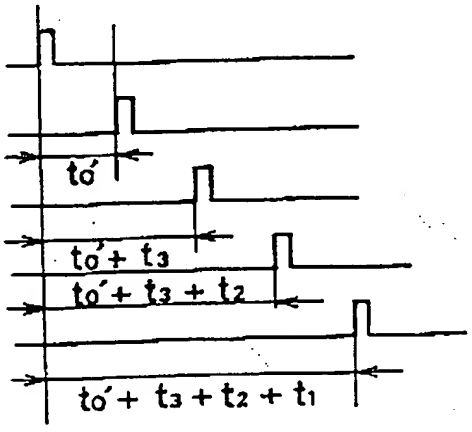


FIG. 6

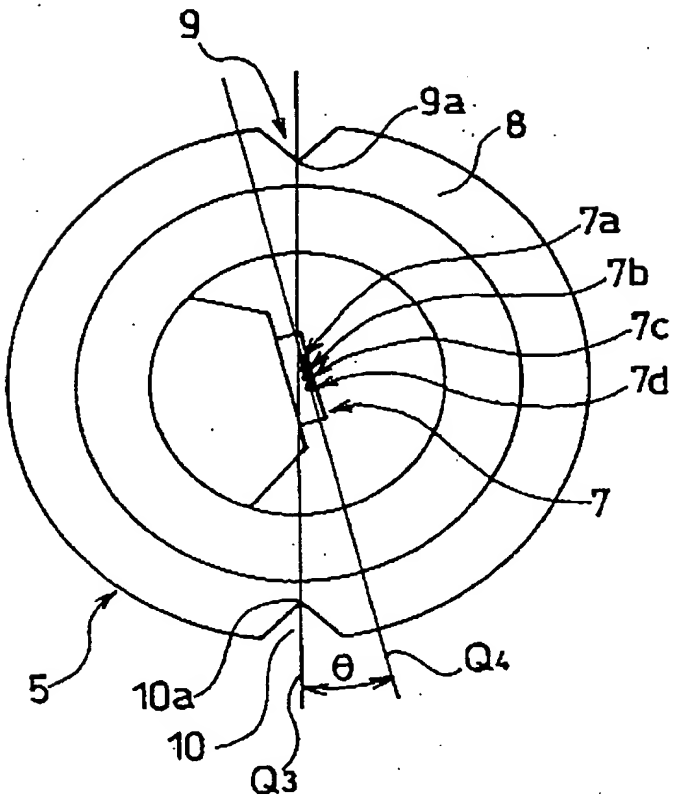


FIG. 7

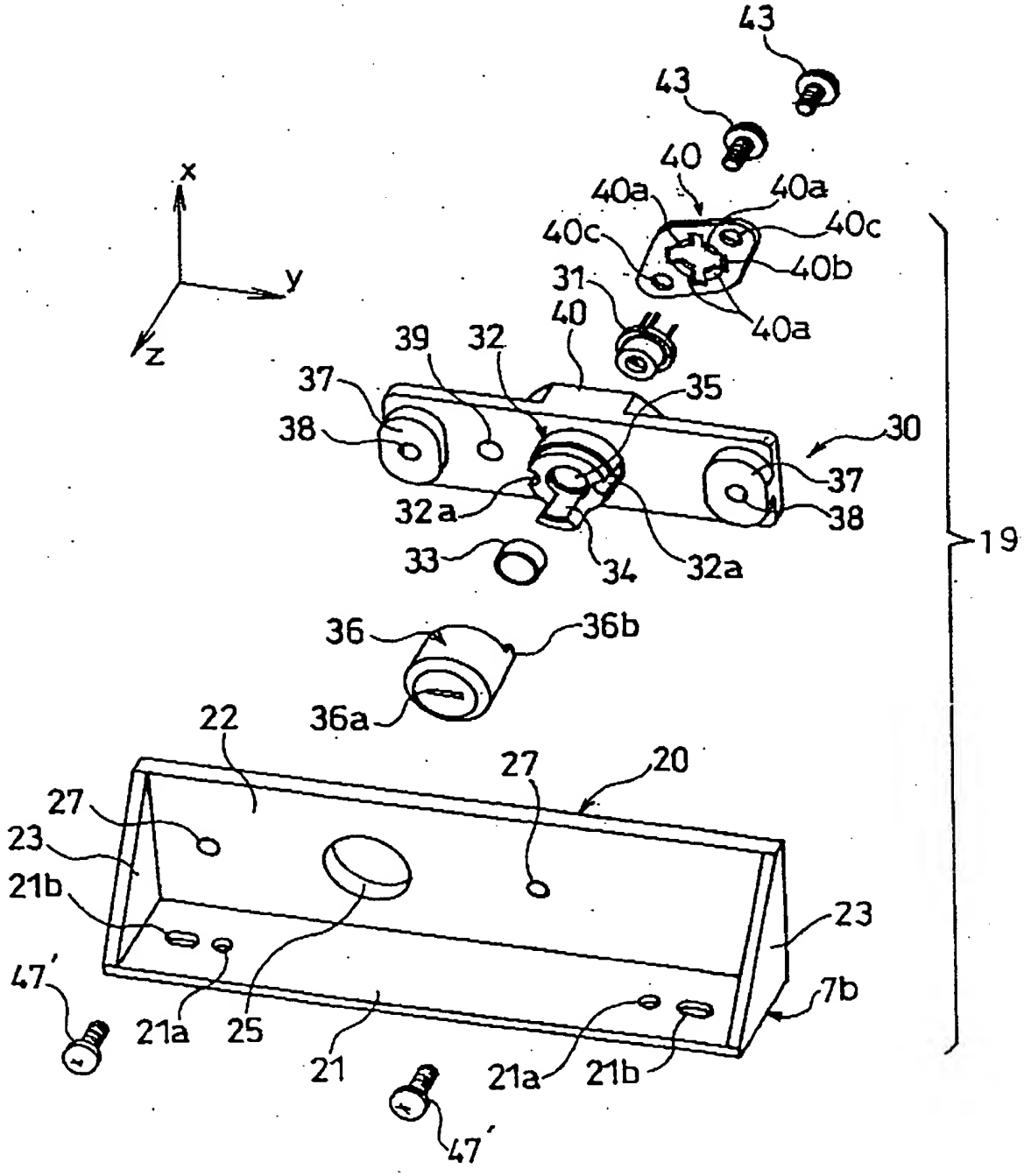

43
43
40
40a
40a
40c
40c
40b
31
40
40a
39
32
37
35
38
30
37
32a
38
33
34
32a
19
36
36b
36a
22
27
20
27
23
21b
23
47'
7b
21a
25
21
21a
21b
47'
x
y
z

FIG.8

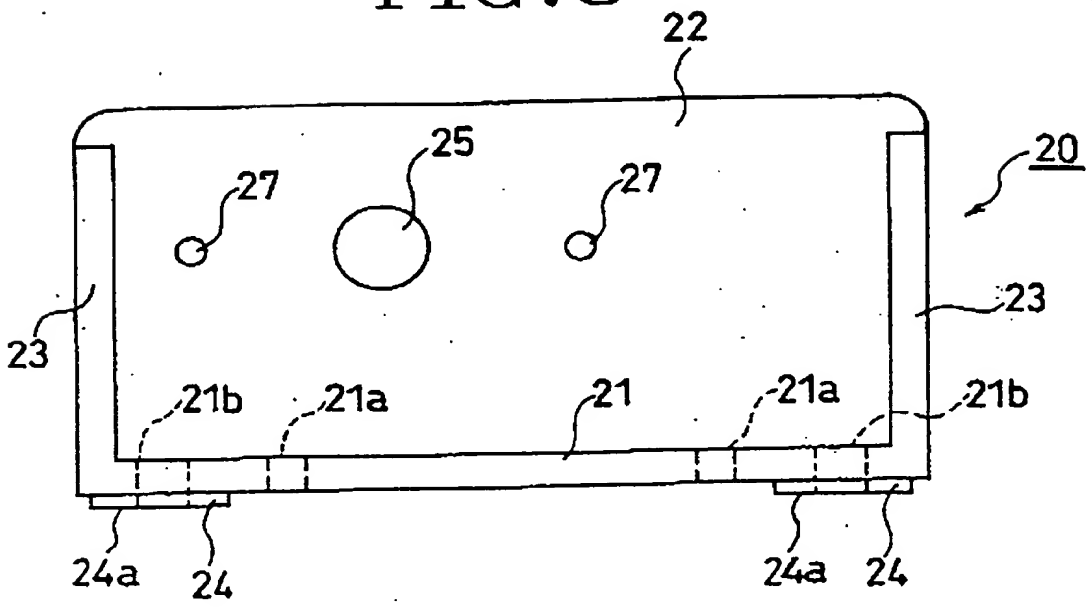

22
25
27
27
20
23
23
21b
21a
21
21a
21b
24a
24
24a
24

FIG.9

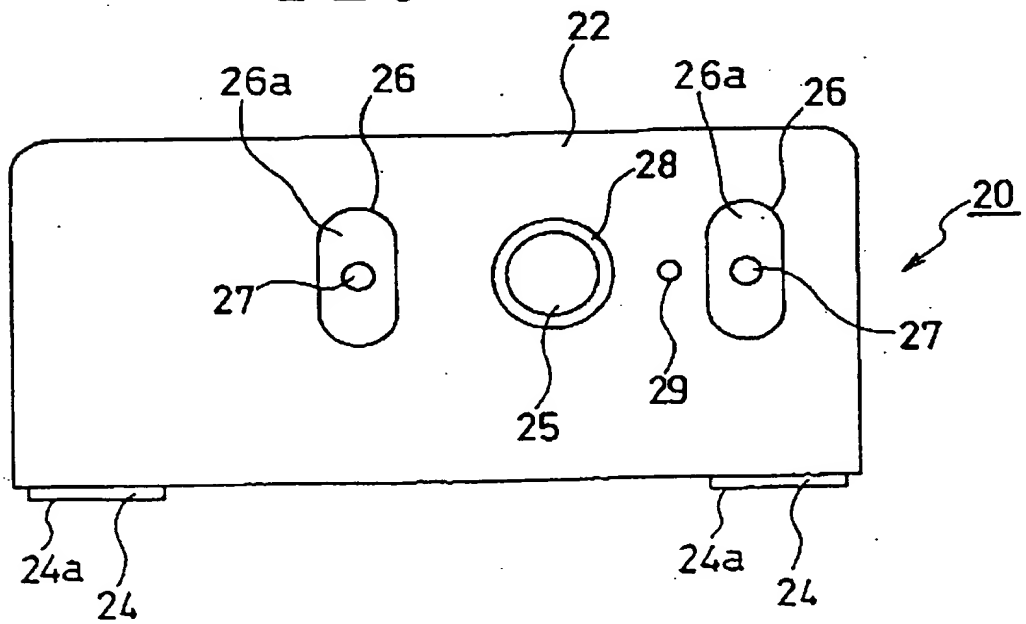

22
26a
26
26a
26
28
20
27
27
25
29
24a
24
24a
24

FIG. 10

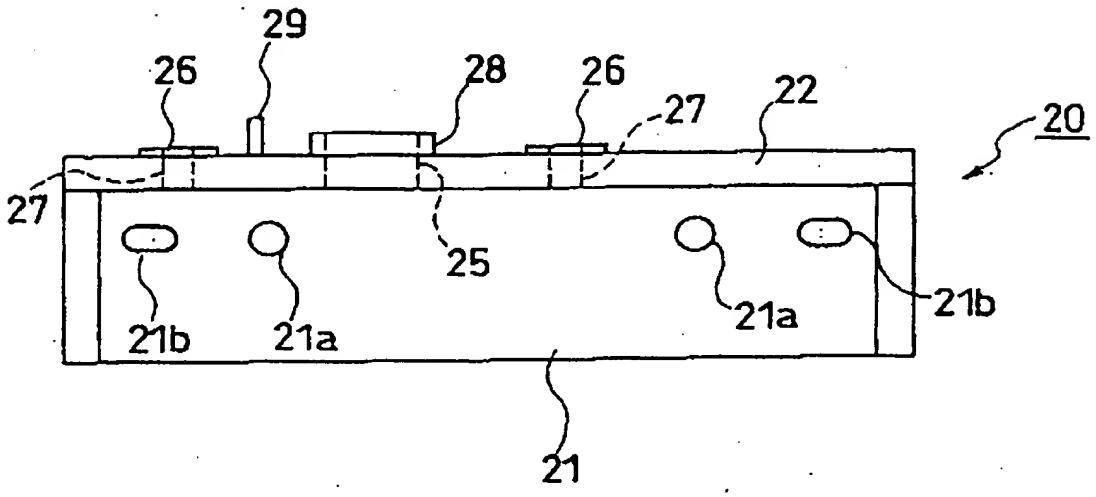


FIG. 11

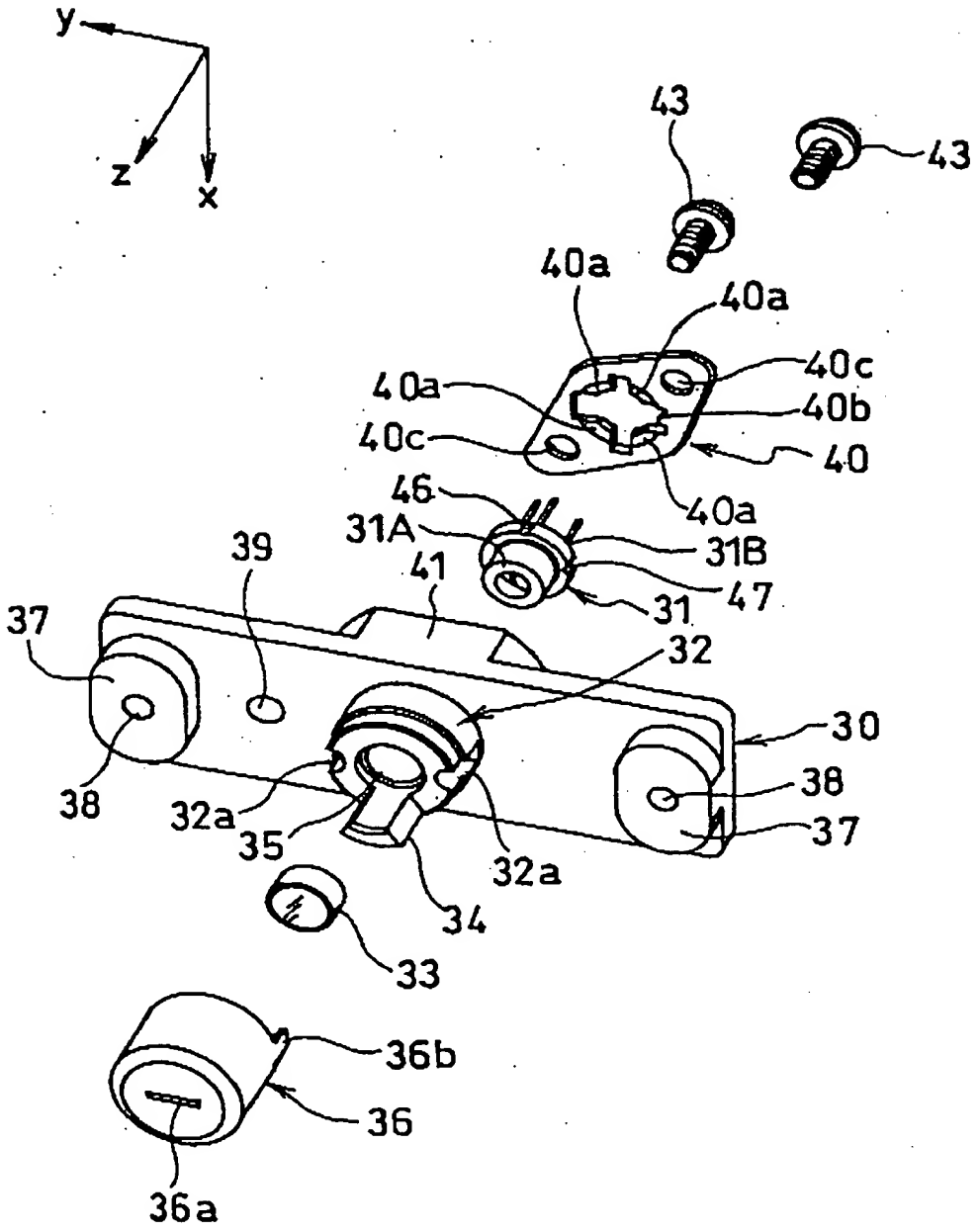

y
z
x
43
43
40a
40a
40a
40c
40b
40
40c
40a
46
31A
31B
47
31
41
39
37
32
30
38
38
32a
35
32a
37
34
33
36b
36
36a

FIG. 12

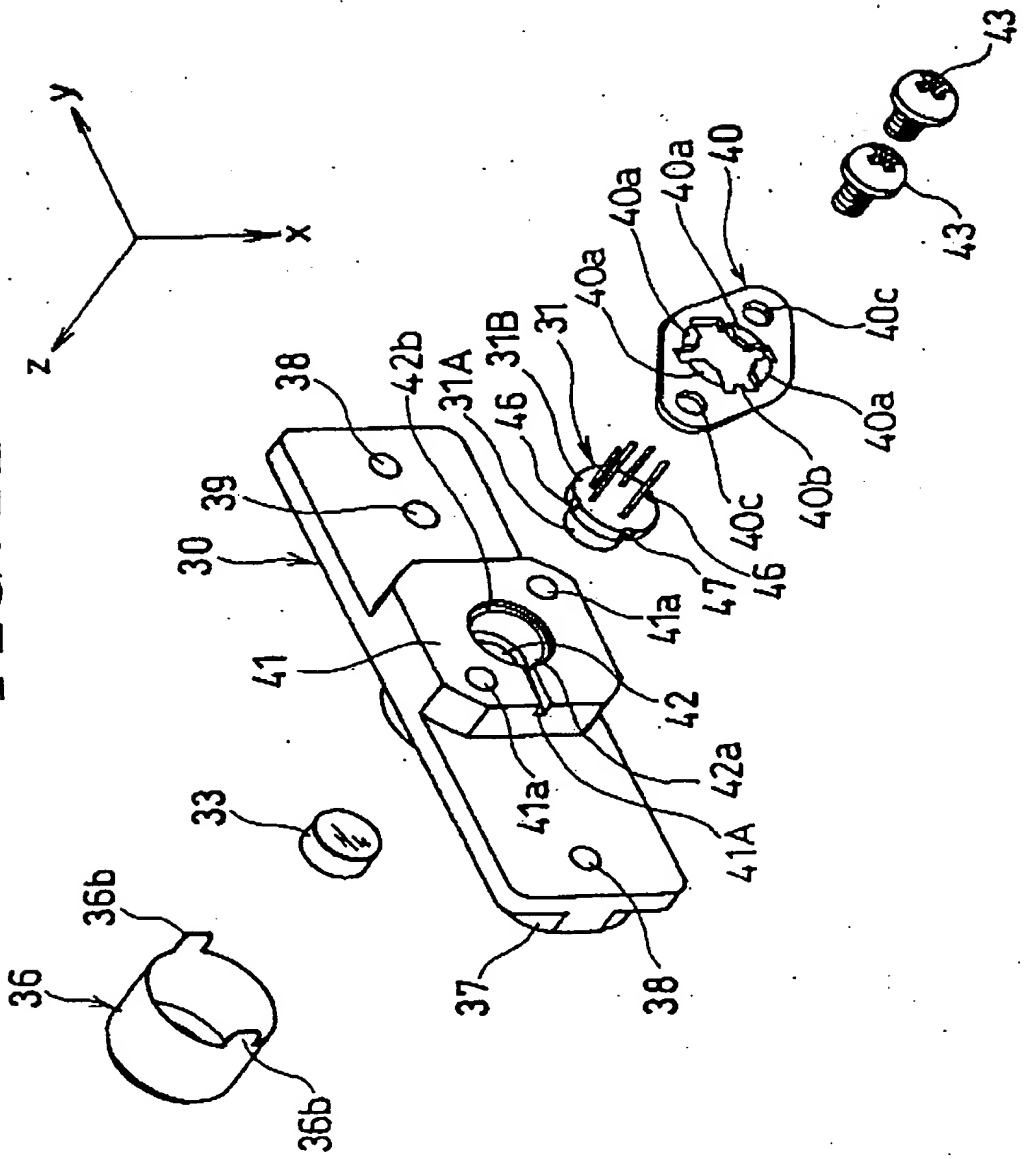

y
x
z
43
43
40
40a
40a
40a
40c
40c
40b
40a
31
31B
31A
38
42b
46
46
47
39
30
41a
41
42
42a
41A
41a
33
36
36b
36b
37
38

FIG. 13

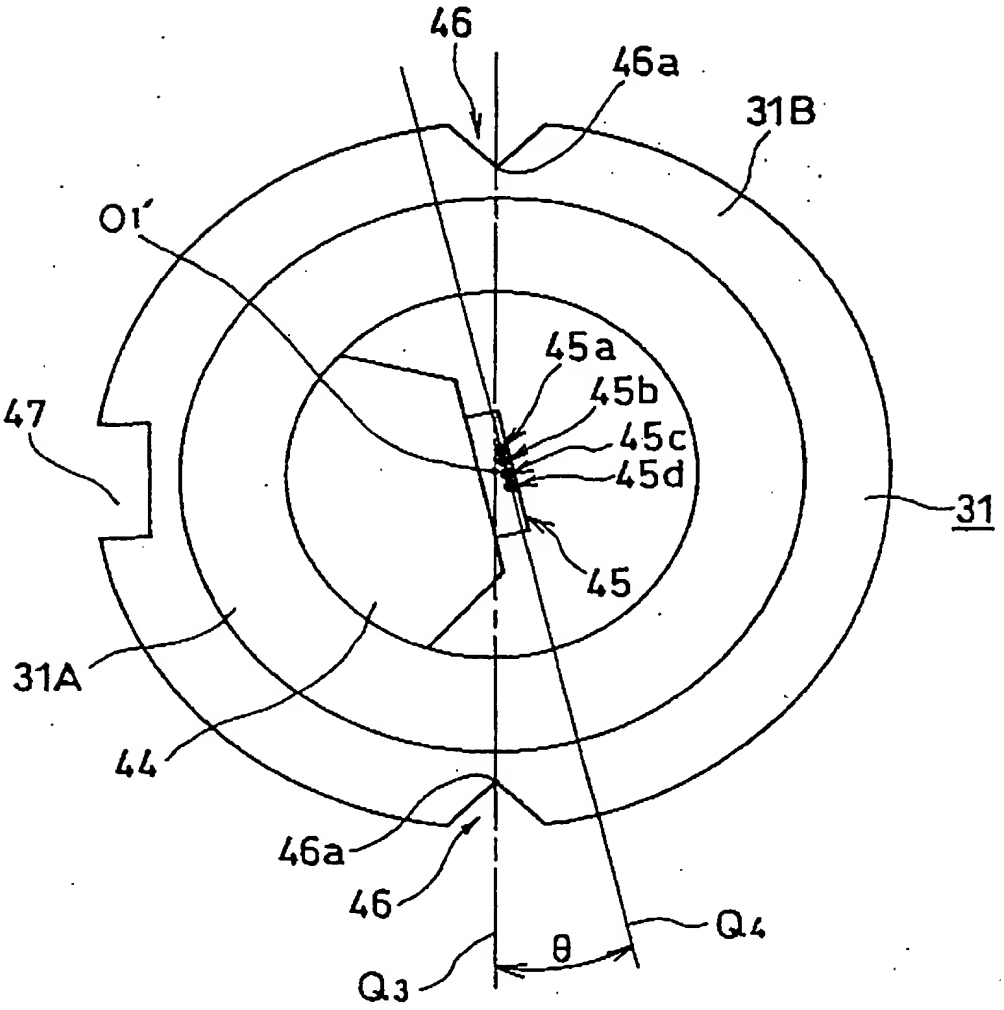


FIG. 14

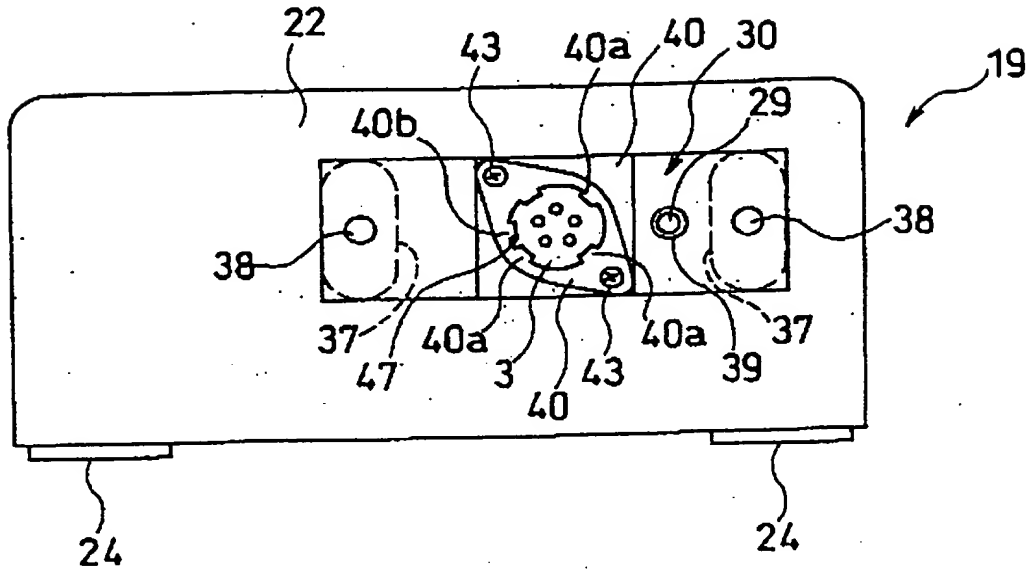

22
43
40a
40
30
19
29
40b
38
38
37
47
40a
3
40
43
40a
39
37
24
24

FIG. 15

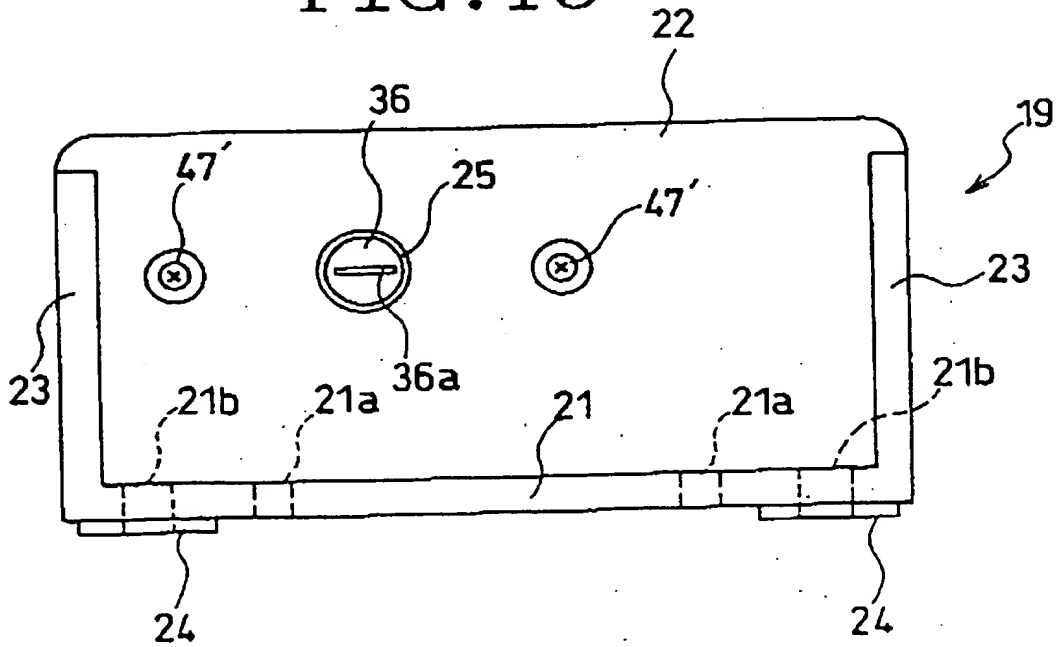

22
36
19
47'
25
47'
23
23
21b
21a
36a
21
21a
21b
24
24

FIG. 16

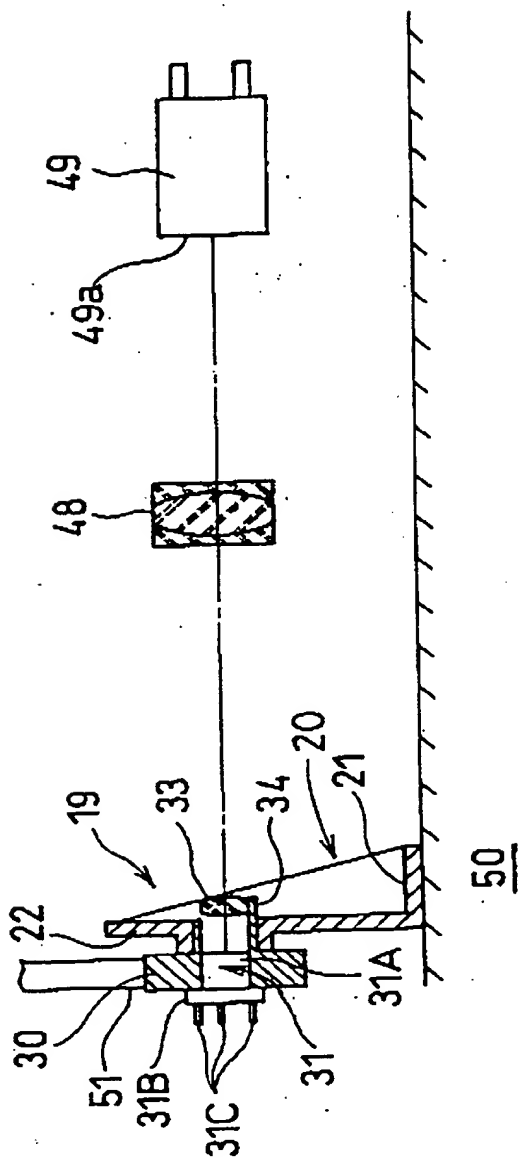


FIG. 17

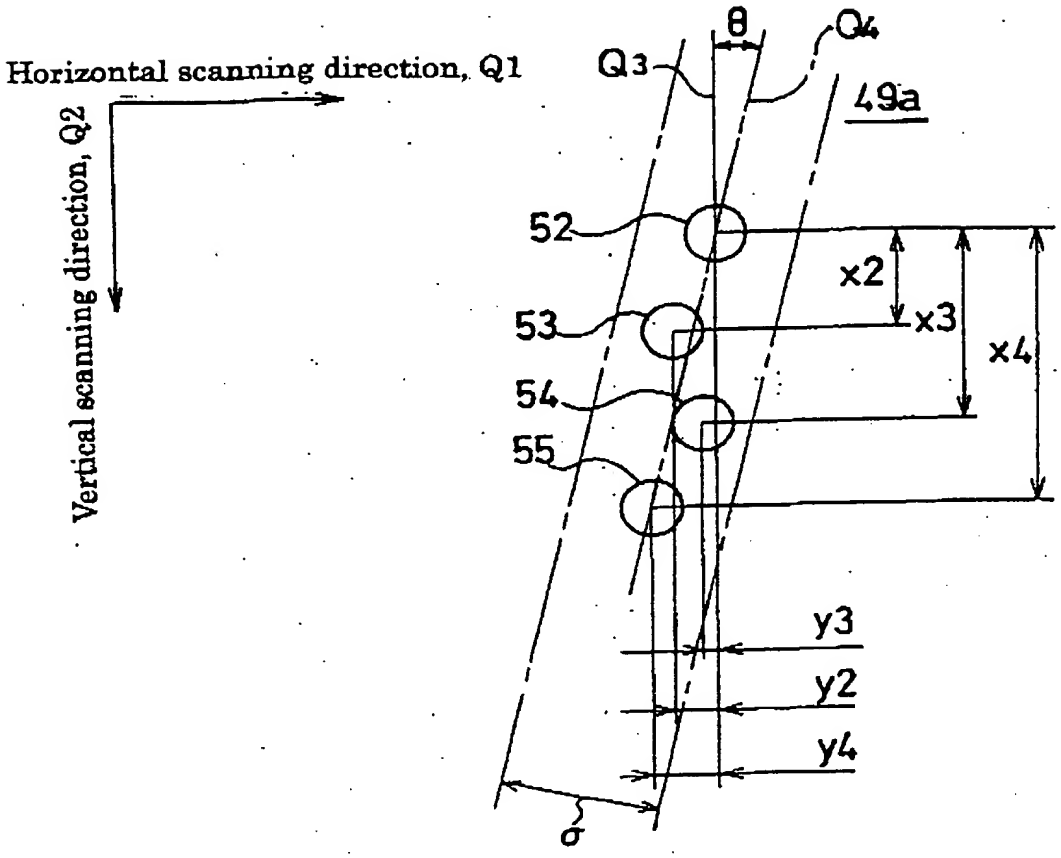

Horizontal scanning direction, Q1
Vertical scanning direction, Q2
θ
Q3
Q4
49a
52
53
54
55
x2
x3
x4
y3
y2
y4
σ

FIG. 18

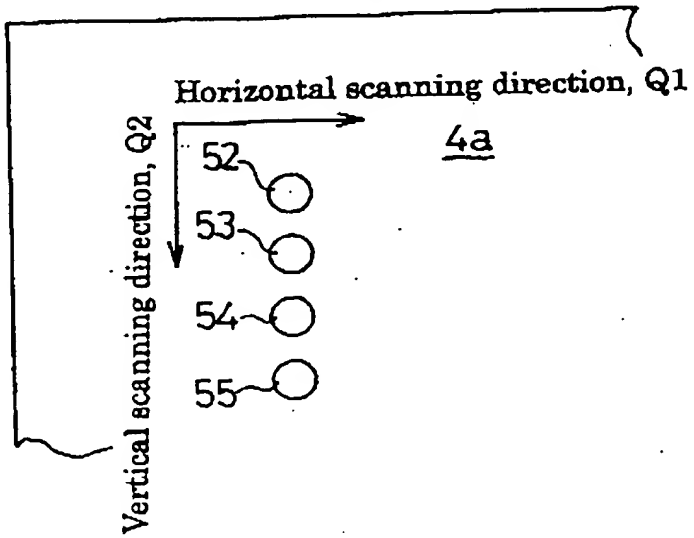

Horizontal scanning direction, Q1
Vertical scanning direction, Q2
4a
52
53
54
55

FIG. 19

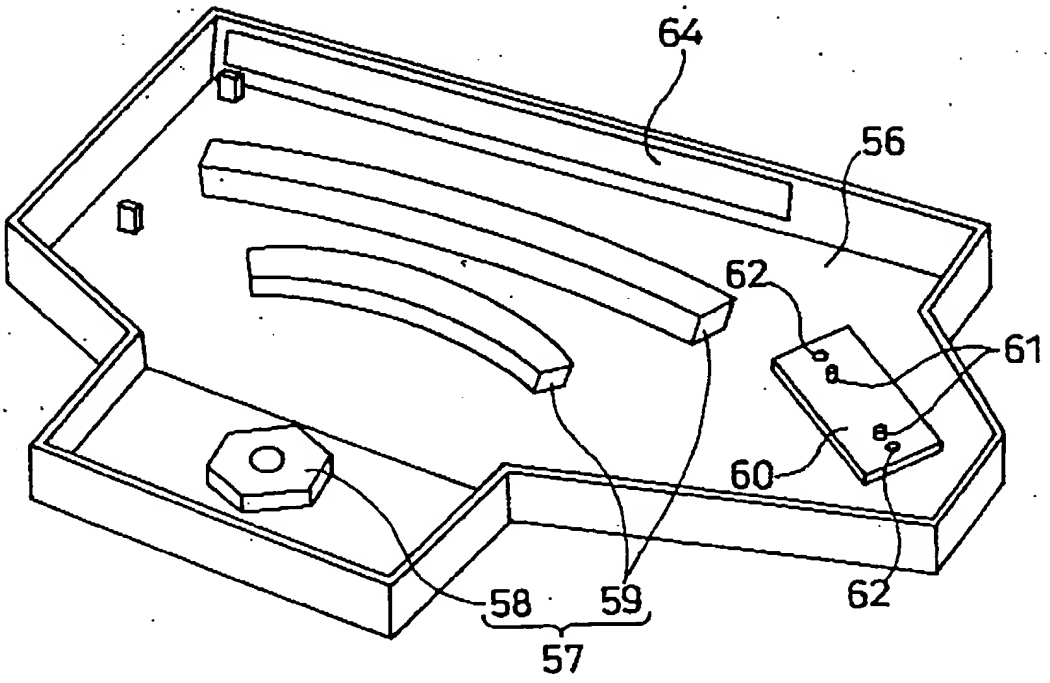


FIG. 20

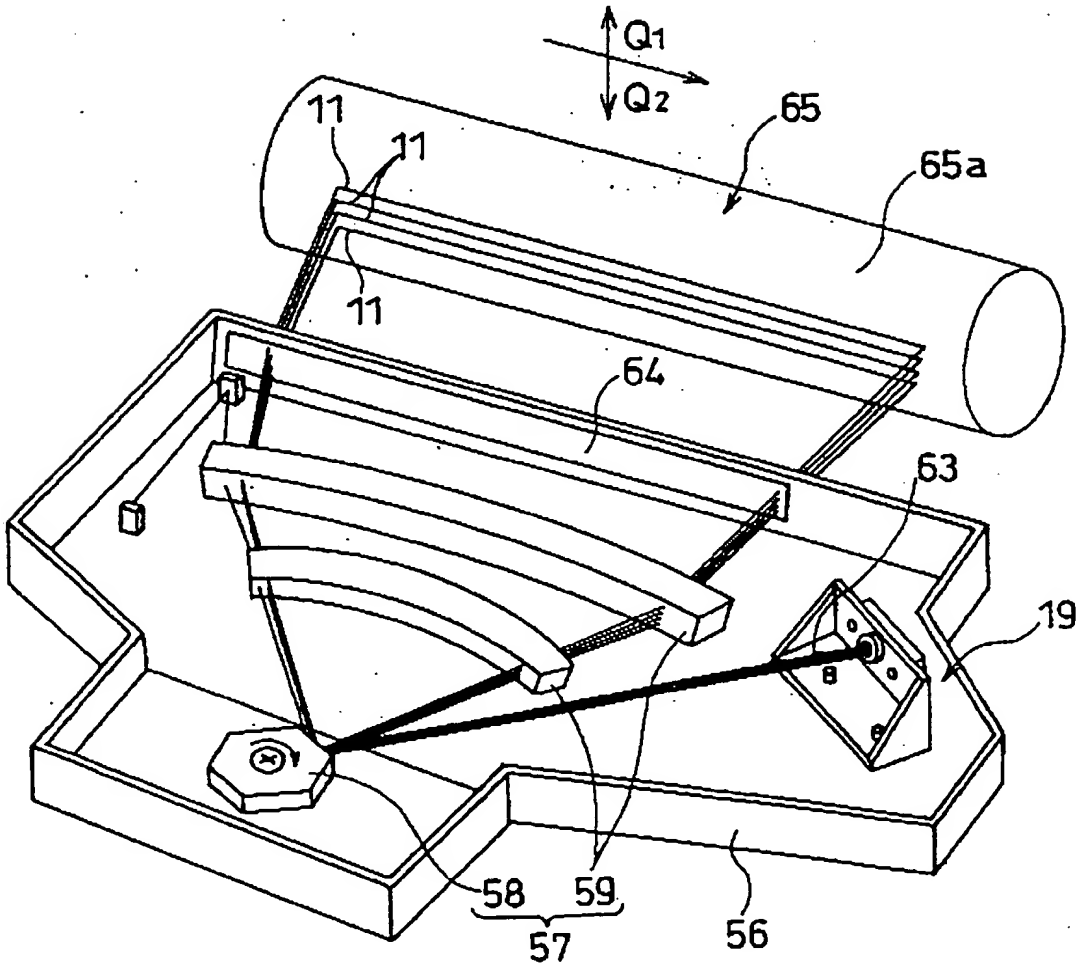


FIG.21

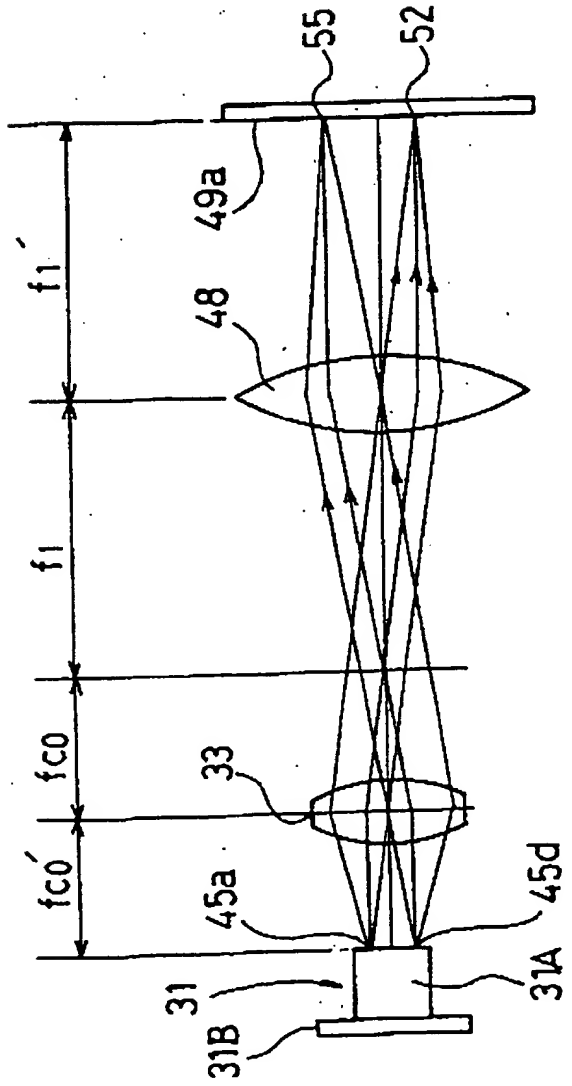


FIG. 22

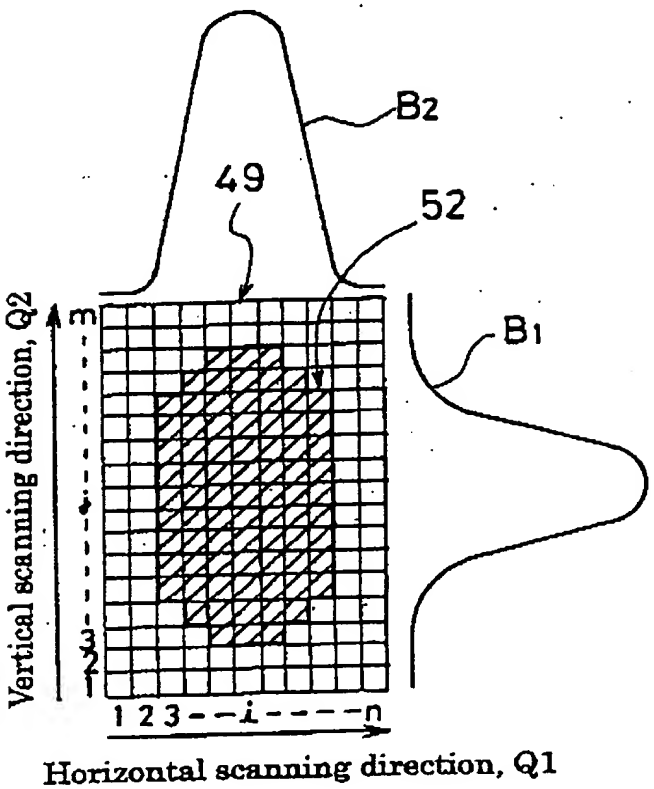

B2
49
52
B1
Vertical scanning direction, Q2
m
3
2
1
1 2 3 - - i - - - - n
Horizontal scanning direction, Q1

FIG. 23

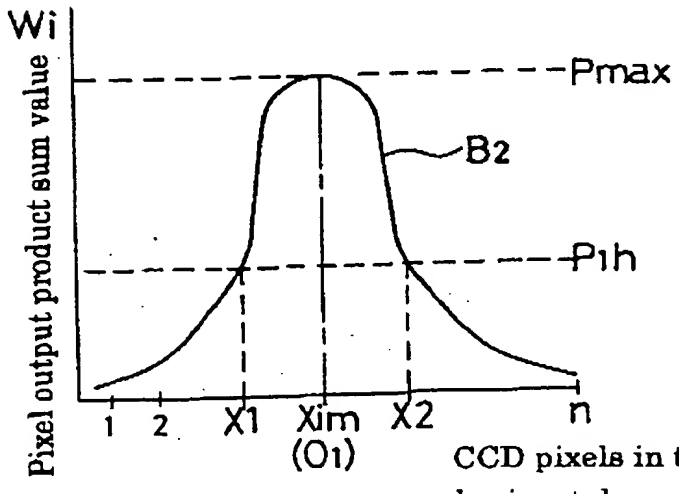

Wi
Pixel output product sum value
Pmax
B2
P1h
1
2
X1
Xim
(O1)
X2
n
CCD pixels in the horizontal scanning direction

FIG. 24

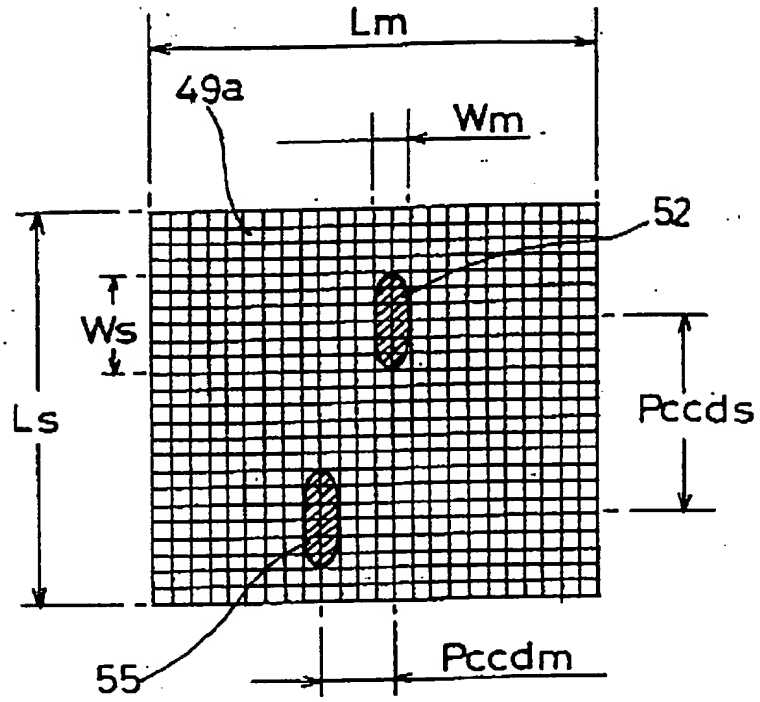

Lm
49a
Wm
52
Ws
Ls
Pccds
55
Pccdm

FIG. 25

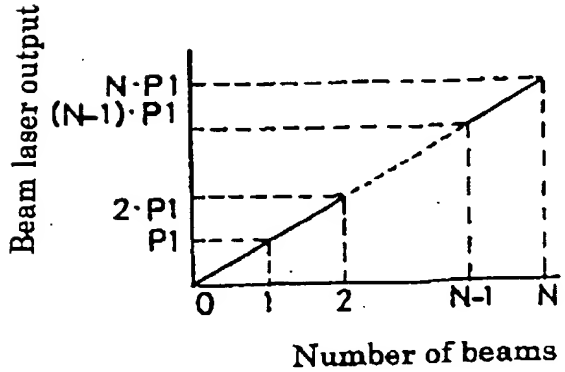

Beam laser output
N·P1
(N-1)·P1
2·P1
P1
0
1
2
N-1
N
Number of beams

FIG.26

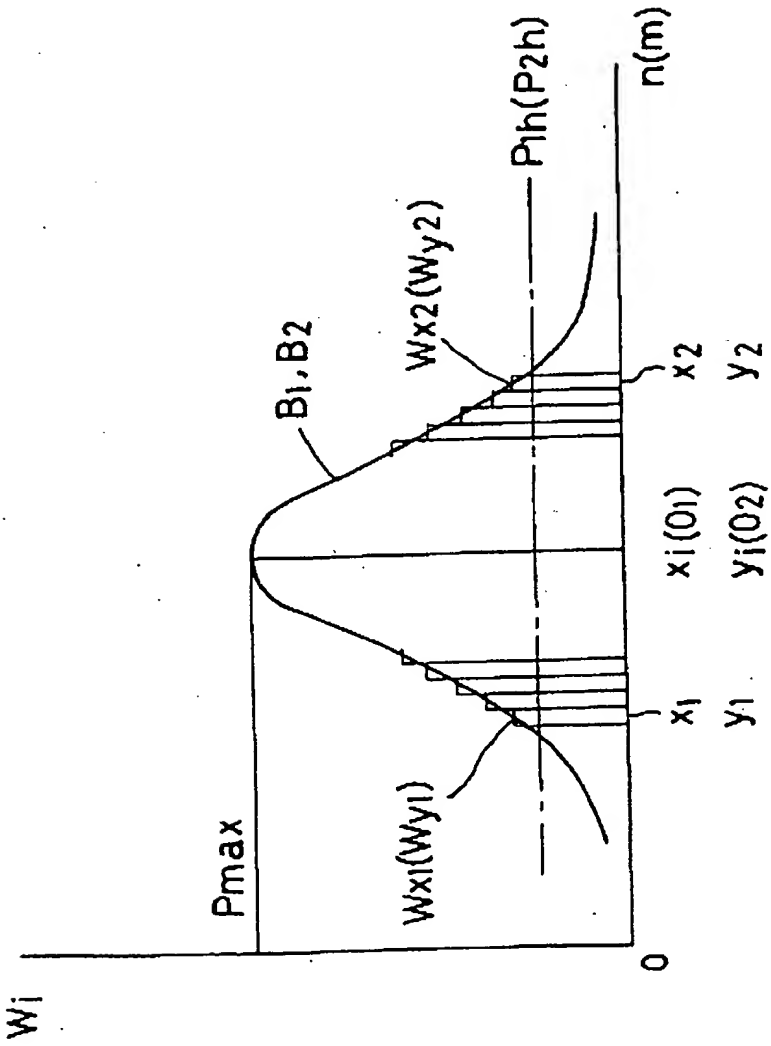


FIG. 27

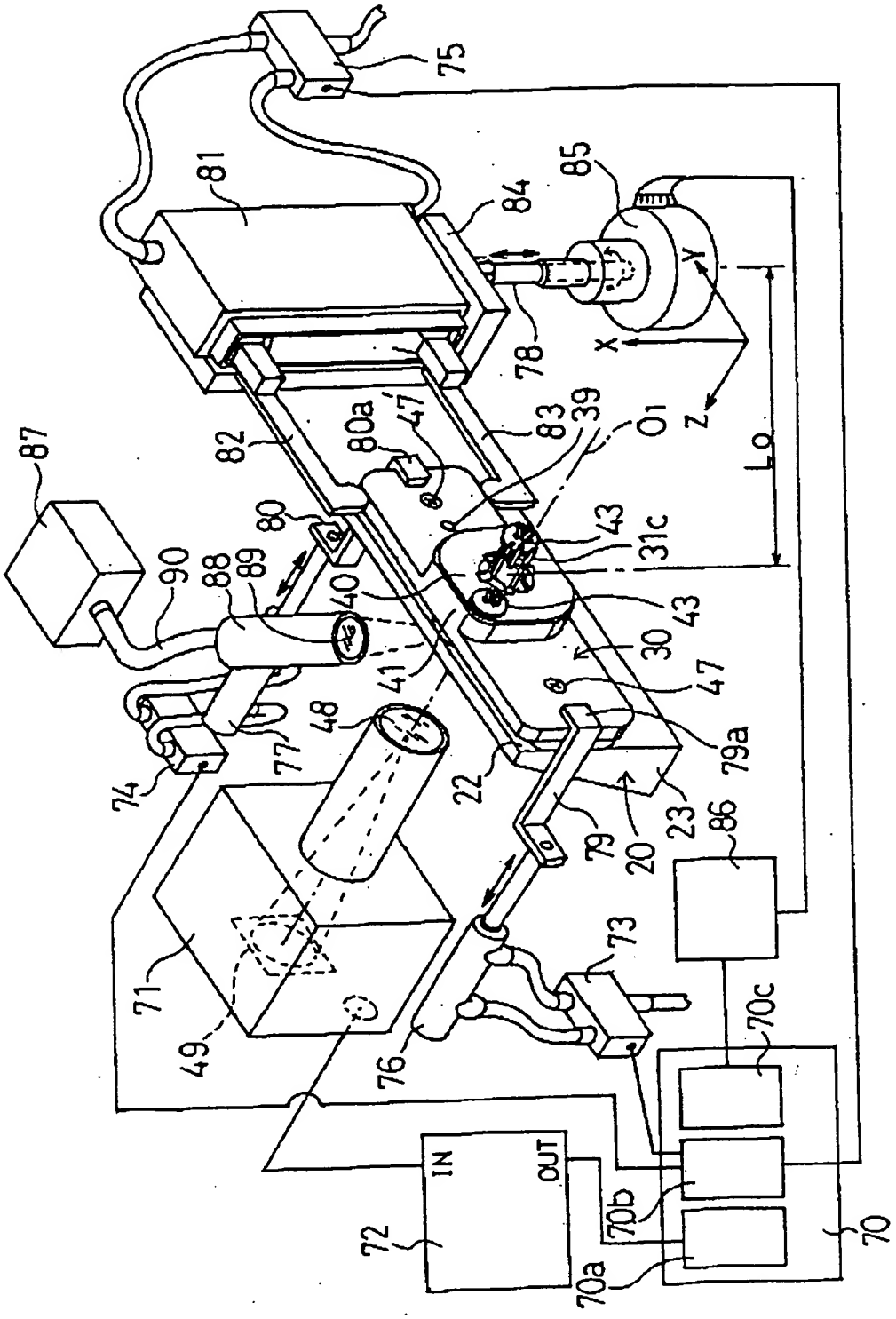

75
81
84
85
78
X
Y
Z
Lo
O1
87
82
80a
47
83
39
80
43
31c
90
88
89
40
30
41
48
77
74
22
79a
79
20
23
86
73
71
49
76
70c
IN
OUT
72
70b
70a
70

FIG. 28

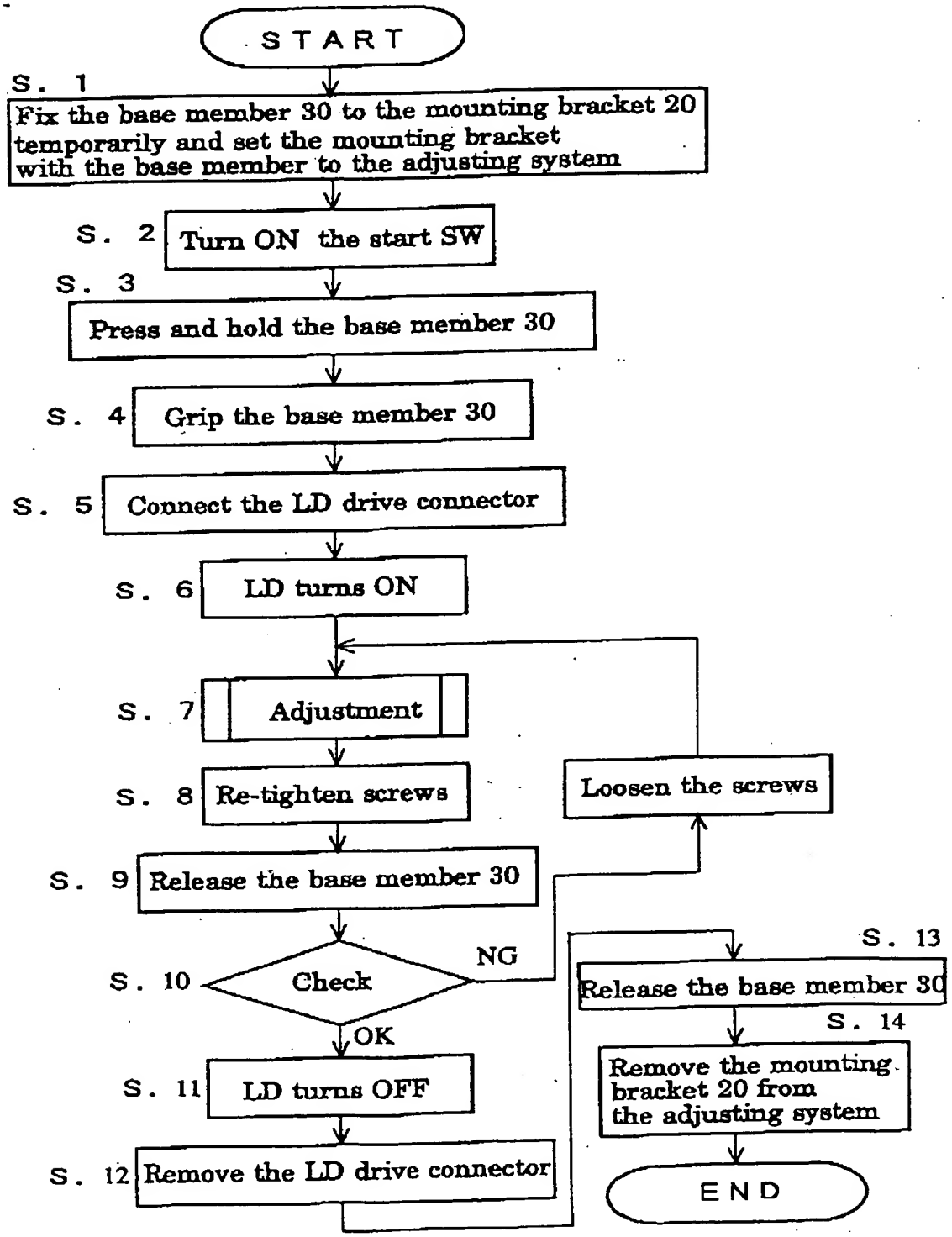

START
S. 1
Fix the base member 30 to the mounting bracket 20 temporarily and set the mounting bracket with the base member to the adjusting system
S. 2
Turn ON the start SW
S. 3
Press and hold the base member 30
S. 4
Grip the base member 30
S. 5
Connect the LD drive connector
S. 6
LD turns ON
S. 7
Adjustment
S. 8
Re-tighten screws
S. 9
Release the base member 30
S. 10
Check
NG
OK
Loosen the screws
S. 11
LD turns OFF
S. 12
Remove the LD drive connector
S. 13
Release the base member 30
S. 14
Remove the mounting bracket 20 from the adjusting system
END

FIG. 29

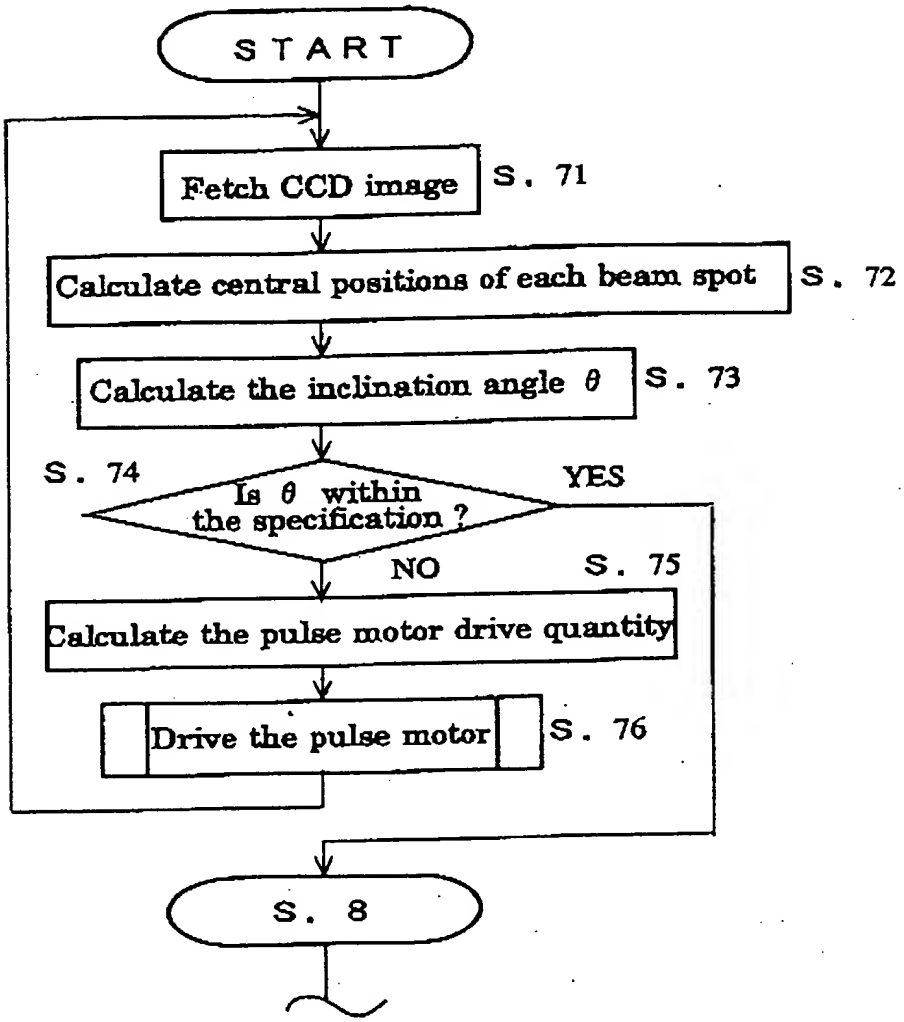

START
Fetch CCD image
S. 71
Calculate central positions of each beam spot
S. 72
Calculate the inclination angle θ
S. 73
S. 74
Is θ within the specification ?
YES
NO
S. 75
Calculate the pulse motor drive quantity
Drive the pulse motor
S. 76
S. 8

FIG. 30

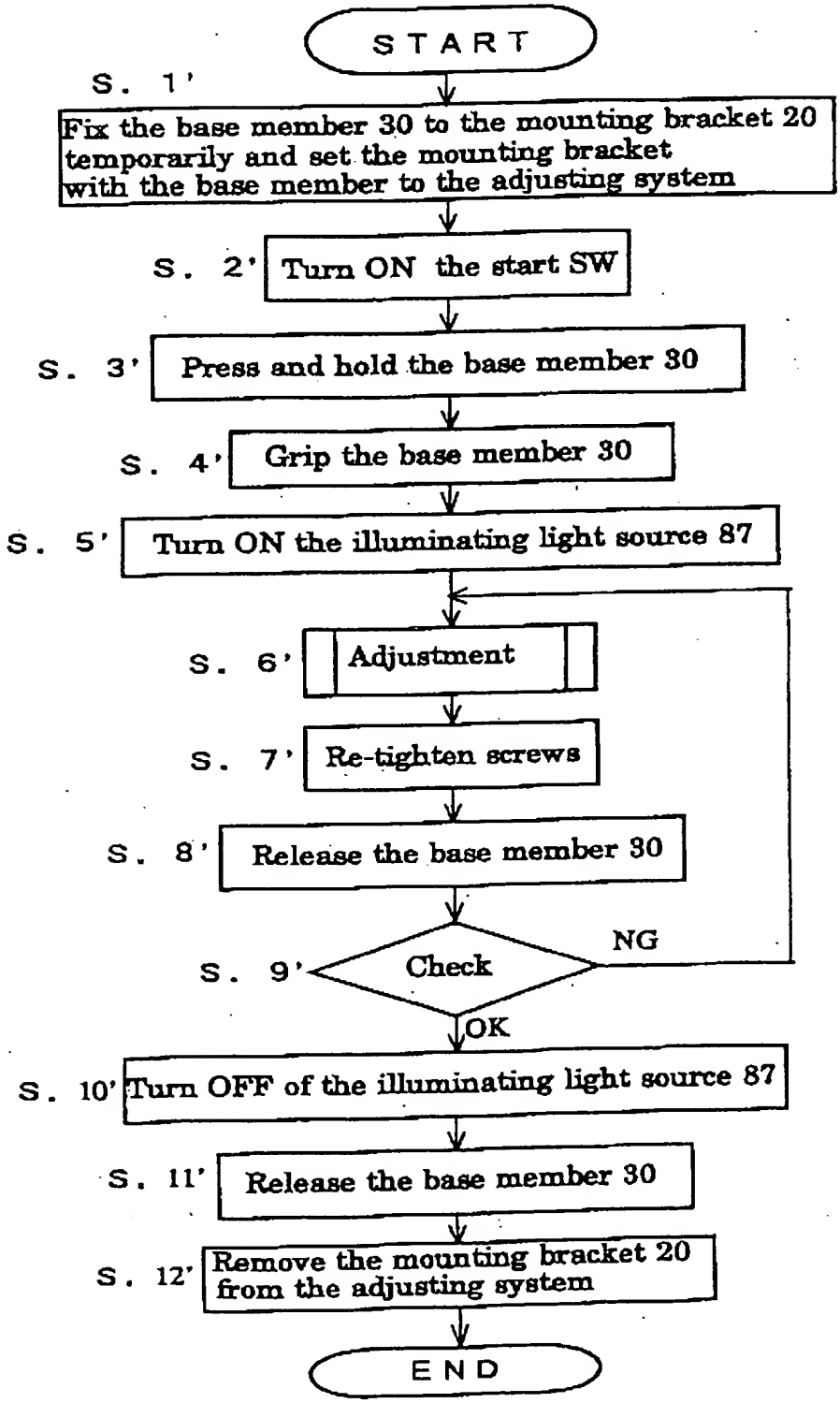

START
S. 1'
Fix the base member 30 to the mounting bracket 20 temporarily and set the mounting bracket with the base member to the adjusting system
S. 2'
Turn ON the start SW
S. 3'
Press and hold the base member 30
S. 4'
Grip the base member 30
S. 5'
Turn ON the illuminating light source 87
S. 6'
Adjustment
S. 7'
Re-tighten screws
S. 8'
Release the base member 30
S. 9'
Check
NG
OK
S. 10'
Turn OFF of the illuminating light source 87
S. 11'
Release the base member 30
S. 12'
Remove the mounting bracket 20 from the adjusting system
END

FIG. 31

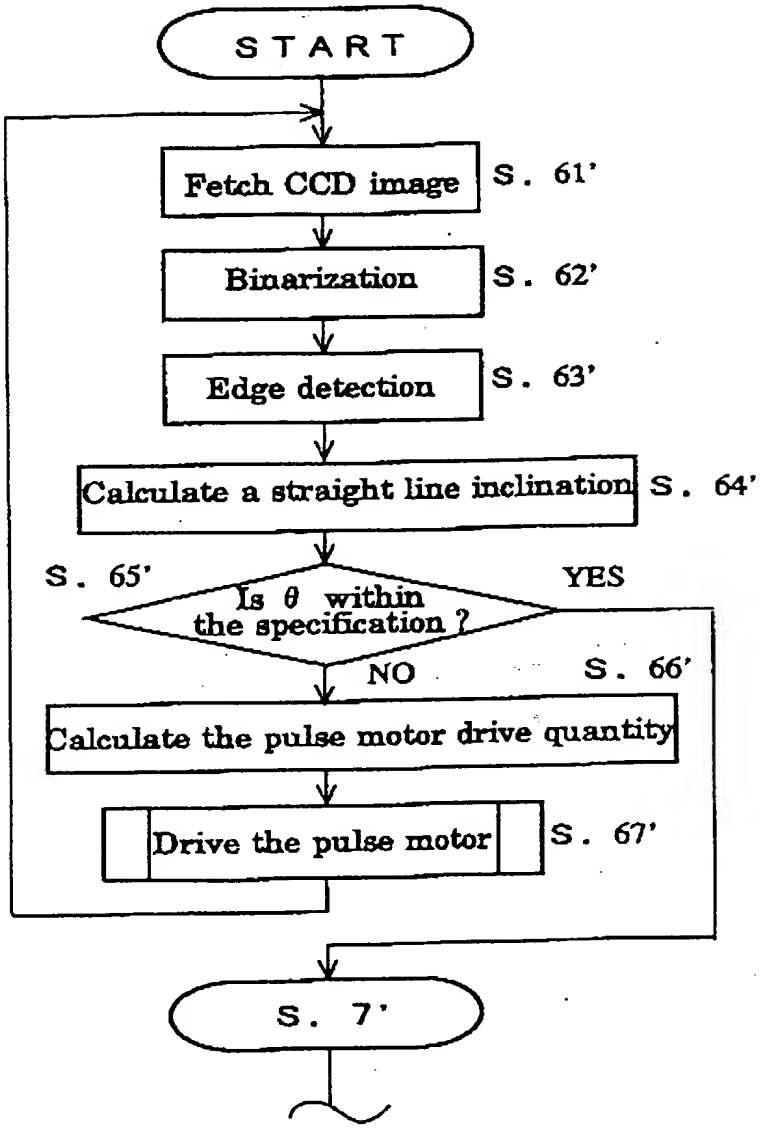

START
Fetch CCD image
S. 61'
Binarization
S. 62'
Edge detection
S. 63'
Calculate a straight line inclination
S. 64'
S. 65'
Is θ within the specification ?
YES
NO
S. 66'
Calculate the pulse motor drive quantity
Drive the pulse motor
S. 67'
S. 7'

FIG.32(a)

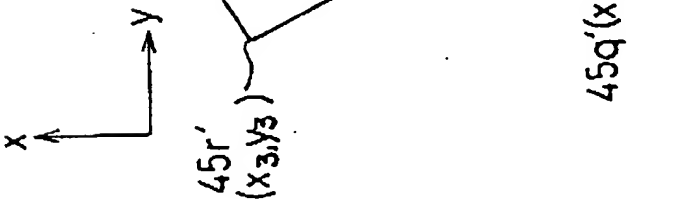


FIG.32(b)

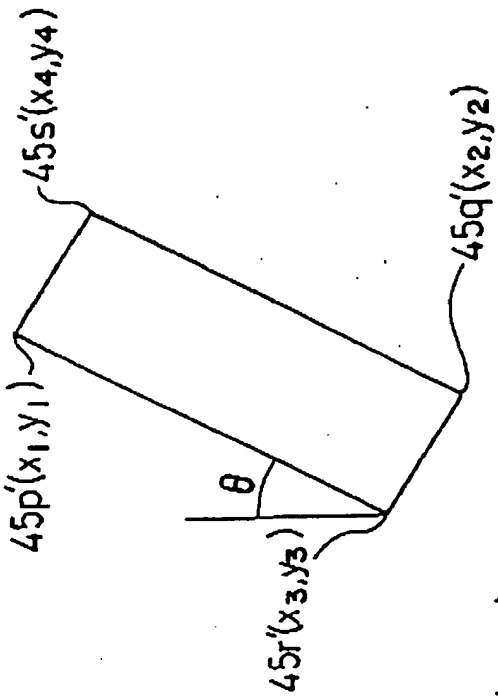


FIG.33

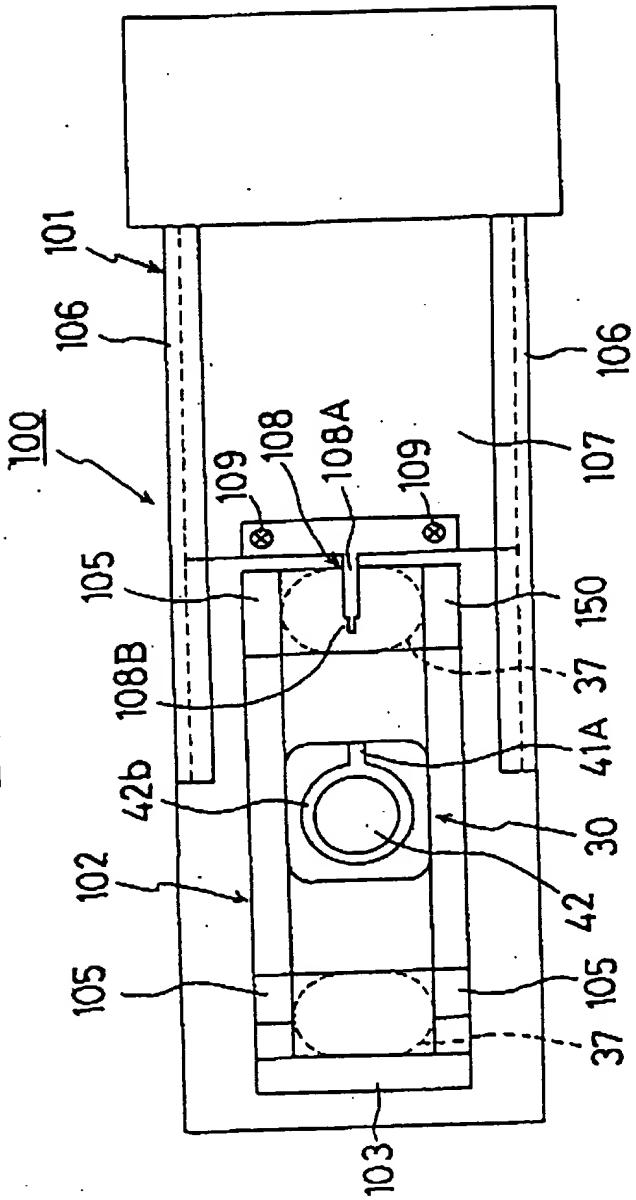
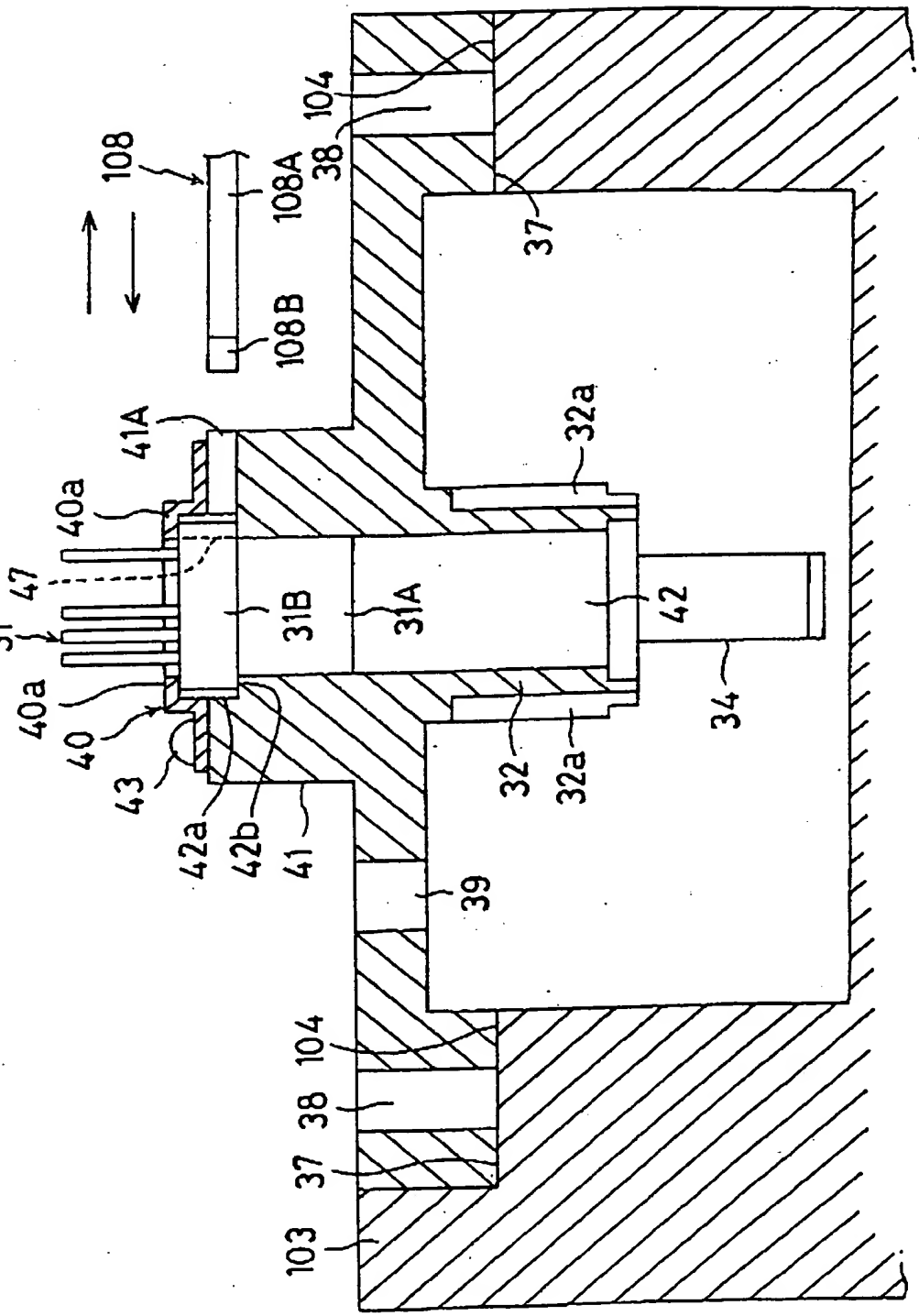

101
106
100
109
108
108A
109
107
106
105
150
108B
37
41A
42b
30
102
42
105
105
37
103

FIG. 34


108
108A
108B
104
38
37
41A
32a
40a
47
31
31B
31A
42
34
40
43
42a
42b
41
39
32
103